Imagine COMMUNICATIONS™

# Installation and Configuration Manual

# SPT™

## SPT-LXYTOLIGHTWAVE Serial Protocol Translator
## X-Y Control Of Lightwave Matrix-Hub Series 1000 Switcher

**Edition B**

**LXYTOLITWVE MAN**

## Publication Information

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# Preface

# Manual Information

## Purpose

This manual details the features, configuration details, and specifications for the SPT-LXYTOLIGHTWAVE serial protocol translator.

## Audience

This manual is written for technicians and operators responsible for installation, setup, maintenance, and/or operation of the product, and is useful to operations personnel for purposes of daily operation and reference.

## Revision History

**Table P-1.** Manual Revision History

| Edition | Date | Comments |
|---|---|---|
| Edition A | September 2002 | Initial release |
| Edition B | June 2007 | • Added power requirements information<br>• Added RoHS-WEEE compliance information<br>• Added index |

# Writing Conventions

To enhance your understanding, the authors of this manual have adhered to the following text conventions:

**Table P-2.** Writing Conventions

| Term or Convention | Description |
|---|---|
| **Bold** | Indicates dialog boxes, property sheets, fields, buttons, check boxes, list boxes, combo boxes, menus, submenus, windows, lists, and selection names |
| *Italics* | Indicates email addresses, the names of books or publications, and the first instances of new terms and specialized words that need emphasis |
| CAPS | Indicates a specific key on the keyboard, such as ENTER, TAB, CTRL, ALT, or DELETE |
| **Code** | Indicates variables or command-line entries, such as a DOS entry or something you type into a field |
| > | Indicates the direction of navigation through a hierarchy of menus and windows |
| hyperlink | Indicates a jump to another location within the electronic document or elsewhere |
| Internet address | Indicates a jump to a website or URL |
| **Note** | Indicates important information that helps to avoid and troubleshoot problems |

# Obtaining Documents

Technical documents can be viewed or downloaded from our website. Alternatively, contact your Customer Service representative to request a document.

# Unpacking/Shipping Information

## Unpacking a Product

This product was carefully inspected, tested, and calibrated before shipment to ensure years of stable and trouble-free service.

1. Check equipment for any visible damage that may have occurred during transit.
2. Confirm that you have received all items listed on the packing list.
3. Contact your dealer if any item on the packing list is missing.
4. Contact the carrier if any item is damaged.
5. Remove all packaging material from the product and its associated components before you install the unit.

Keep at least one set of original packaging, in the event that you need to return a product for servicing.

## Returning a Product

In the unlikely event that your product fails to operate properly, please contact Customer Service to obtain a Return Authorization (RA) number, then send the unit back for servicing.

Keep at least one set of original packaging in the event that a product needs to be returned for service. If the original package is not available, you can supply your own packaging as long as it meets the following criteria:

- The packaging must be able to withstand the product's weight.
- The product must be held rigid within the packaging.
- There must be at least 2 in. (5 cm) of space between the product and the container.
- The corners of the product must be protected.

Ship products back to us for servicing prepaid and, if possible, in the original packaging material. If the product is still within the warranty period, we will return the product prepaid after servicing.

# Compliance and Safety Standards

Appendix A: "Safety Precautions, Certifications, and Compliances" contains product compliance and safety standards.

## Restriction on Hazardous Substances (RoHS) Compliance

Directive 2002/95/EC—commonly known as the European Union (EU) Restriction on Hazardous Substances (RoHS)—sets limits on the use of certain substances found in electrical and electronic equipment. The intent of this legislation is to reduce the amount of hazardous chemicals that may leach out of landfill sites or otherwise contaminate the environment during end-of-life recycling. The Directive takes effect on July 1, 2006, and it refers to the following hazardous substances:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr-V1)
- Polybrominated Biphenyls (PBB)
- Polybrominated Diphenyl Ethers (PBDE)

According to this EU Directive, all products sold in the European Union will be fully RoHS-compliant and "lead-free." (See our website for more information on dates and deadlines for compliance.) Spare parts supplied for the repair and upgrade of equipment sold before July 1, 2006 are exempt from the legislation. Equipment that complies with the EU directive will be marked with a RoHS-compliant emblem, as shown in Figure P-1.

**Figure P-1.** RoHS Compliance Emblem

## Waste from Electrical and Electronic Equipment (WEEE) Compliance

The European Union (EU) Directive 2002/96/EC on Waste from Electrical and Electronic Equipment (WEEE) deals with the collection, treatment, recovery, and recycling of electrical and electronic waste products. The objective of the WEEE Directive is to assign the responsibility for the disposal of associated hazardous waste to either the producers or users of these products. Effective August 13, 2005, producers or users will be required to recycle electrical and electronic equipment at end of its useful life, and may not dispose of the equipment in landfills or by using other unapproved methods. (Some EU member states may have different deadlines.)

In accordance with this EU Directive, companies selling electric or electronic devices in the EU will affix labels indicating that such products must be properly recycled. (See our website for more information on dates and deadlines for compliance.) Contact your local sales representative for information on returning these products for recycling. Equipment that complies with the EU directive will be marked with a WEEE-compliant emblem, as shown in Figure P-2.

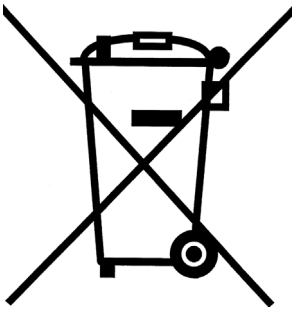


**Figure P-2.** WEEE Compliance Emblem

# Safety

Carefully review all safety precautions to avoid injury and prevent damage to this product or any products connected to it. You will find a complete list of safety precautions in Appendix A. Any user-serviceable components (such as fuses or batteries) are only replaceable by those components listed in the manual.

***IMPORTANT!*** Only qualified personnel should perform service procedures.

## Safety Terms and Symbols in this Manual

**WARNING**

**Statements identifying conditions or practices that may result in personal injury or loss of life. High voltage is present.**

**CAUTION**

**Statements identifying conditions or practices that can result in damage to the equipment or other property.**

Chapter 1

# Introduction

The SPT serial protocol translator is a compact adapter that translates between Harris protocol and protocols used by other manufacturers or equipment. The SPT can be used to integrate otherwise incompatible devices in a system, and it may be used to expand a system beyond the normal limitations imposed by hardware or system design. The SPT is available in several modes, each of which is covered in a separate manual. For a complete list of available models, refer to the *SPT Applications Guide*.

**Figure 1-1.** SPT Serial Protocol Translator

# Applications Involving the SPT-LXYTOLIGHTWAVE

The SPT-LXYTOLIGHTWAVE may be used with a Harris routing switcher to allow control of the switcher via automation system software written for the Lightwave Matrix-Hub Series 1000[1] matrix switcher. The SPT translates X-Y commands to Lightwave commands, and Lightwave responses to X-Y responses. The Lightwave product interfaces to the SPT serial port, and X-Y interfaces to the SPT X-Y BNC port. In this application, the SPT will translate from Matrix-Hub protocol to the protocol required by the routing switcher (see Figure 1-2).

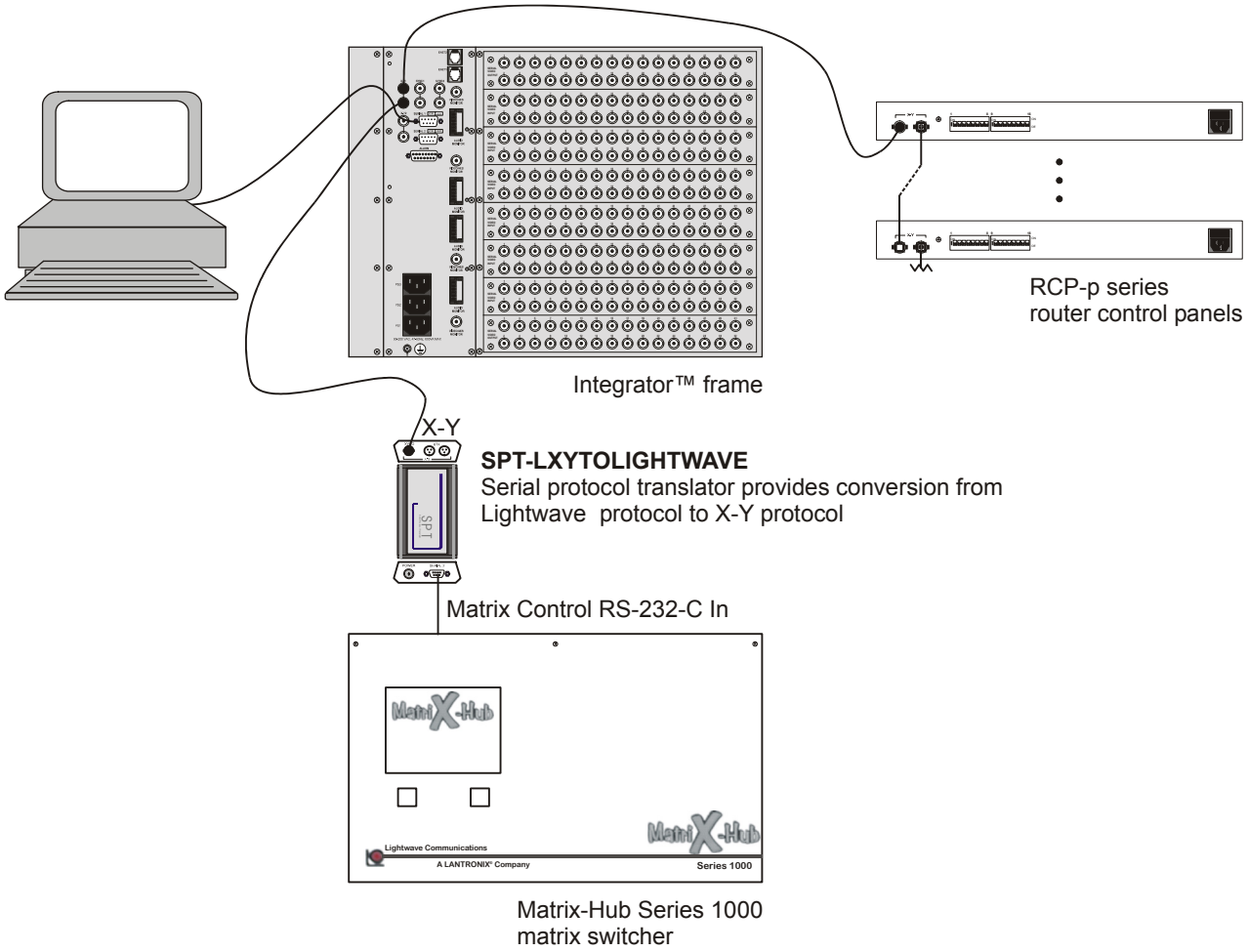



**Figure 1-2.** Interfacing to Matrix-Hub Series 1000 Control System

[1] The Lightwave Matrix-Hub Series 1000 matrix switch is a product of Lightwave Communications, Milford Connecticut.

Chapter 2

# Installation

## Installing the SPT-LXYTOLIGHTWAVE

The SPT-LXYTOLIGHTWAVE is installed in the control line (see Figure 2-1).

- The maximum allowable distance for each segment of the X-Y coaxial cable run is 2,000 ft (609 m).
- The maximum length for each RS-422 segment is 2,000 ft (609 m).
- The maximum length for each RS-232 segment is 50 ft (15 m).

There is no limit to the number of control devices added to the X-Y control bus.

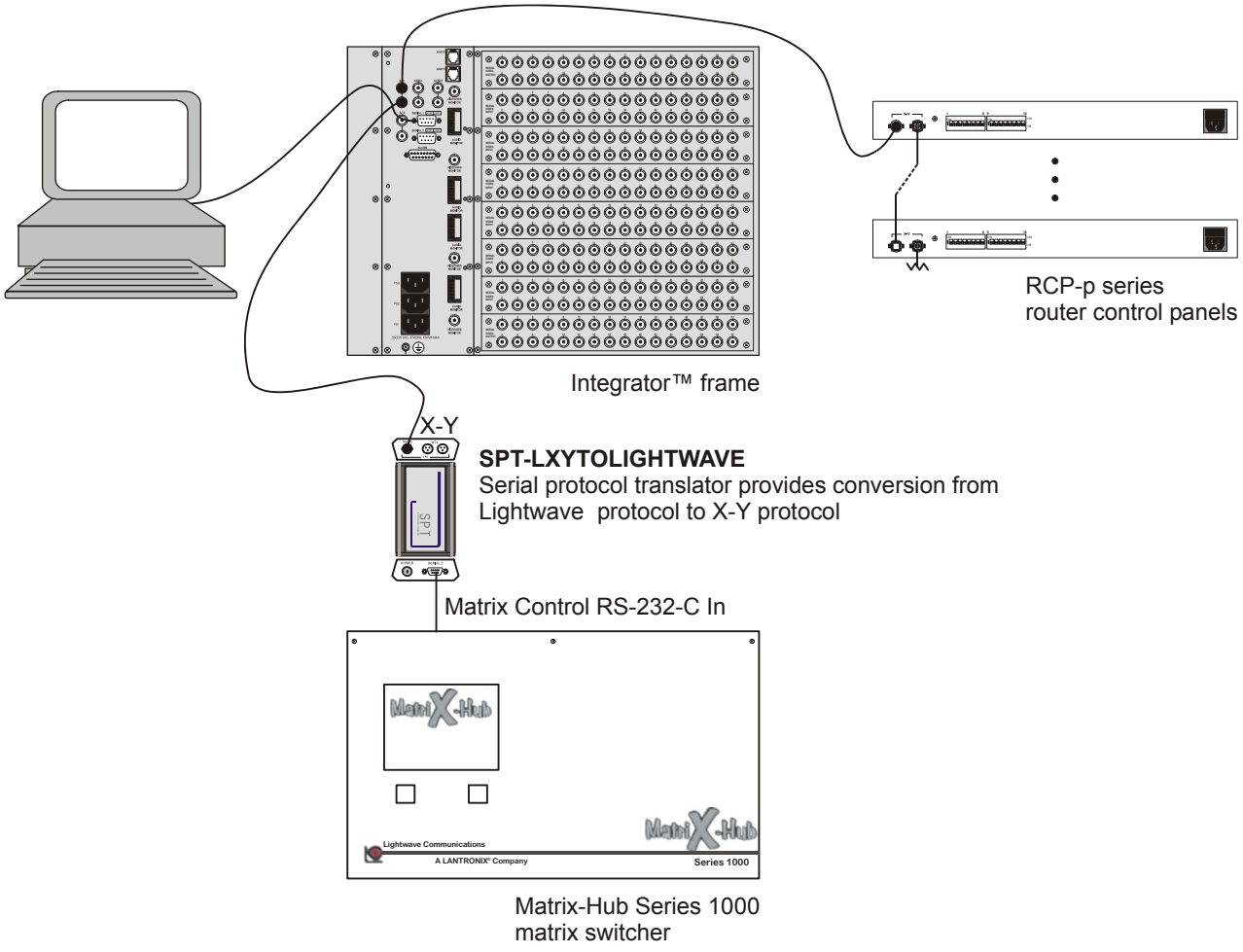



**Figure 2-1.** Connecting the SPT-LXYTOLIGHTWAVE

**DB-9 Male**

| Port Configured For RS-232 | |
|---|---|
| **Pin** | **Function** |
| 1 | |
| 2 | RxD (data received by router) |
| 3 | TxD (data sent by router) |
| 4 | |
| 5 | Ground |
| 6 | |
| 7 | |
| 8 | |
| 9 | |

**Figure 2-2.** Serial Connector Pin Assignments

# Cable Wiring Details

The Matrix-Hub is shipped with an RS-232C straight-through cable included. Figure 2-3 shows the connector pin assignments on both ends of the connection and the cable wiring description is shown in-between the connectors.

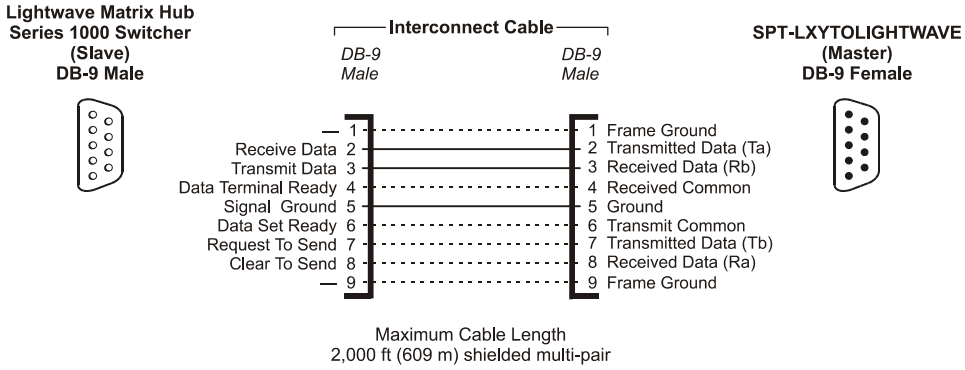



**Figure 2-3.** Cable Wiring Details for SPT-LXYTOLIGHTWAVE

# Power Requirements

## Locations with 110-127 Volt Electrical Systems

**Note**

If you did not receive the correct adaptor for your electrical system, please contact your Customer Service representative. See our website for contact information for our service centers worldwide.

Locations with 110-127 volt electrical systems should use the **PD9200PL6A** adaptor.

**Figure 2-4.** PD9200PL6A Adaptor

- Input voltage: 120 VAC, 60 Hz
- Input current: 60 mA max.
- Output voltage: 9.0 VDC
- Output current: 200 mA
- Output connector: 5.5 mm×2.5 mm female barrel power plug with positive center (see Figure 2-4)

# Locations with 220-240 Volt Electrical Systems

Locations with 220-240 volt electrical systems should use the **PD9300EPL6A** adaptor.

**Figure 2-5.** D9300EPL6A Adaptor

- Input voltage: 230 VAC, 5 0Hz
- Input current: 40 mA max
- Output voltage: 9.0 VDC
- Output current: 30 0mA
- Output connector: 5.5 mm×2.5 mm female barrel power plug with positive center (see Figure 2-5)

Chapter 3

# Configuration and Assembly

## Configuring the SPT-LXYTOLIGHTWAVE

**Note**

In the unlikely event that you need to change settings, see Figure 3-1 and Figure 3-2 for more information on these settings.

The SPT-LXYTOLIGHTWAVE is shipped from the factory preconfigured for use. In most cases, it will not be necessary to reconfigure the SPT. The following parameters, however, are user-configurable:

**Table 3-1.** Settings

| User-Configurable Setting | Factory Default Setting |
|---|---|
| RS-422 jumper switch | RS-232 |
| Serial port baud rate | 9600 baud |
| X-Y on XLR termination (the XLR ports must be terminated if the SPT is located at the end of the bus) | Terminated |
| SPT Address (ID) | 1 |

### RS-232/RS-422 Preference Settings

The serial port level of the Matrix-Hub handles both RS-232 and RS-422 connections, but only one or the other at a time can be used for a source's level. One DIP switch will be required to express RS-232/RS-422 preference. See Figure 3-2 for an illustration.

### Level Offset

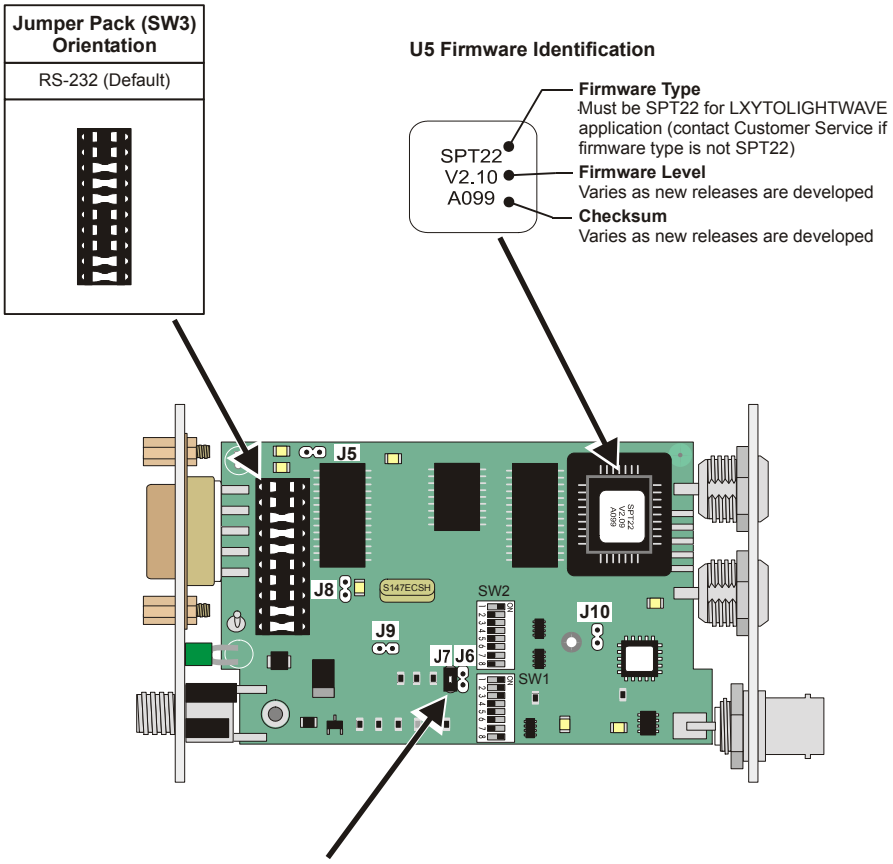
The SPT-LXYTOLIGHTWAVE uses four levels. Those levels are consecutive in the following order:

- Video
- Mouse and Keyboard
- Serial Port
- Other

The four levels can either be enumerated as the top four levels (4-7), or the bottom four levels (0-3) with the level offset DIP switch. See Figure 3-2 for an illustration.

# DIP Switch and Jumper Settings

Configuration is accomplished via DIP switch and jumper settings, as shown in Figure 3-1 and Figure 3-2.




**Suitcase Jumpers**

| Jumper Designator | Setting |
|---|---|
| J5 | Not installed |
| J6 | Not installed |
| J7 | Not installed |
| J8 | Not installed |
| J9 | Not installed |
| J10 | Not installed |

**Important**

*To ensure proper Identification of new parameters, update the label on the back of the SPT whenever you modify any switch or jumper settings*

**Figure 3-1.** DIP Switch and Jumper Locations

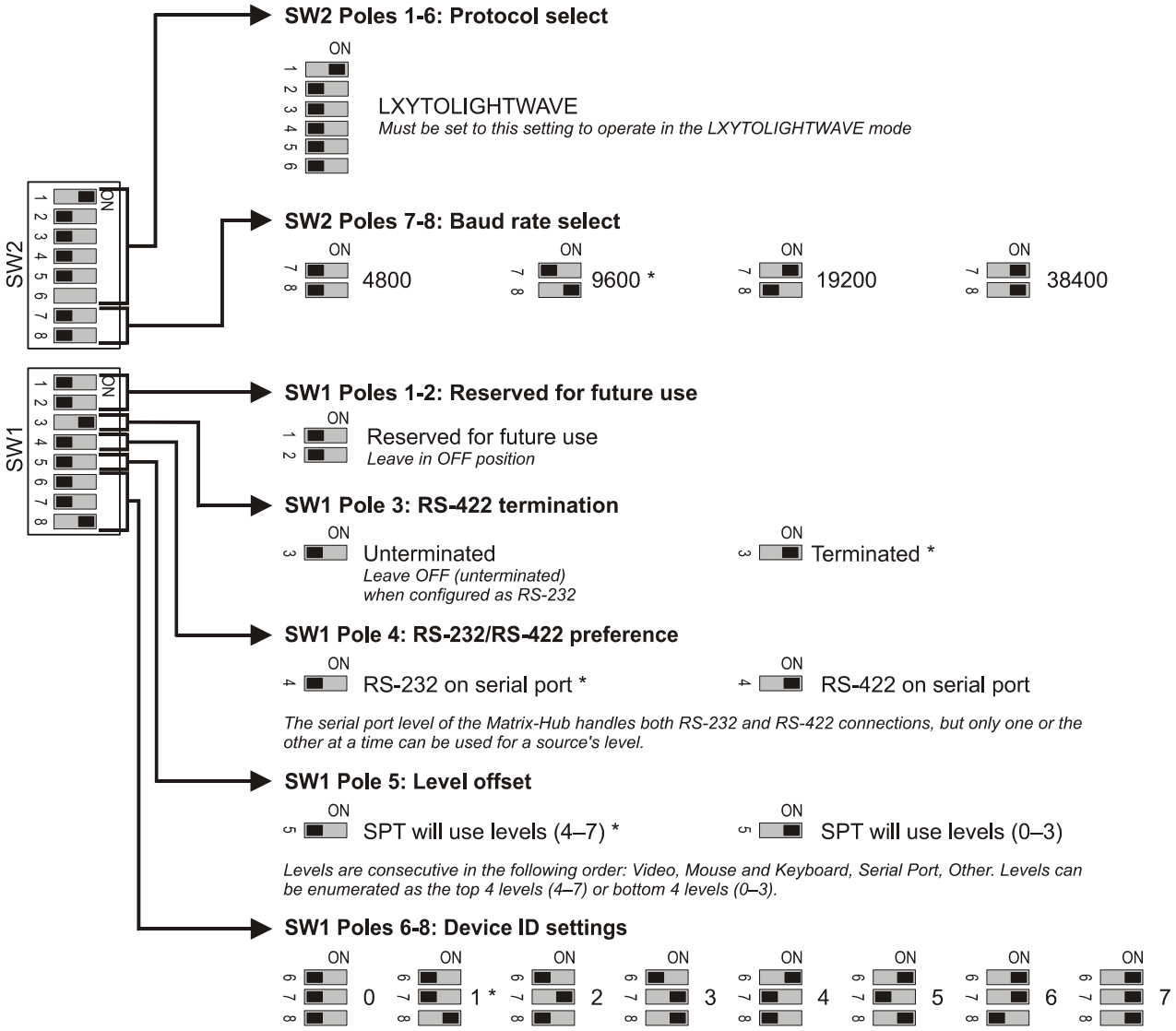
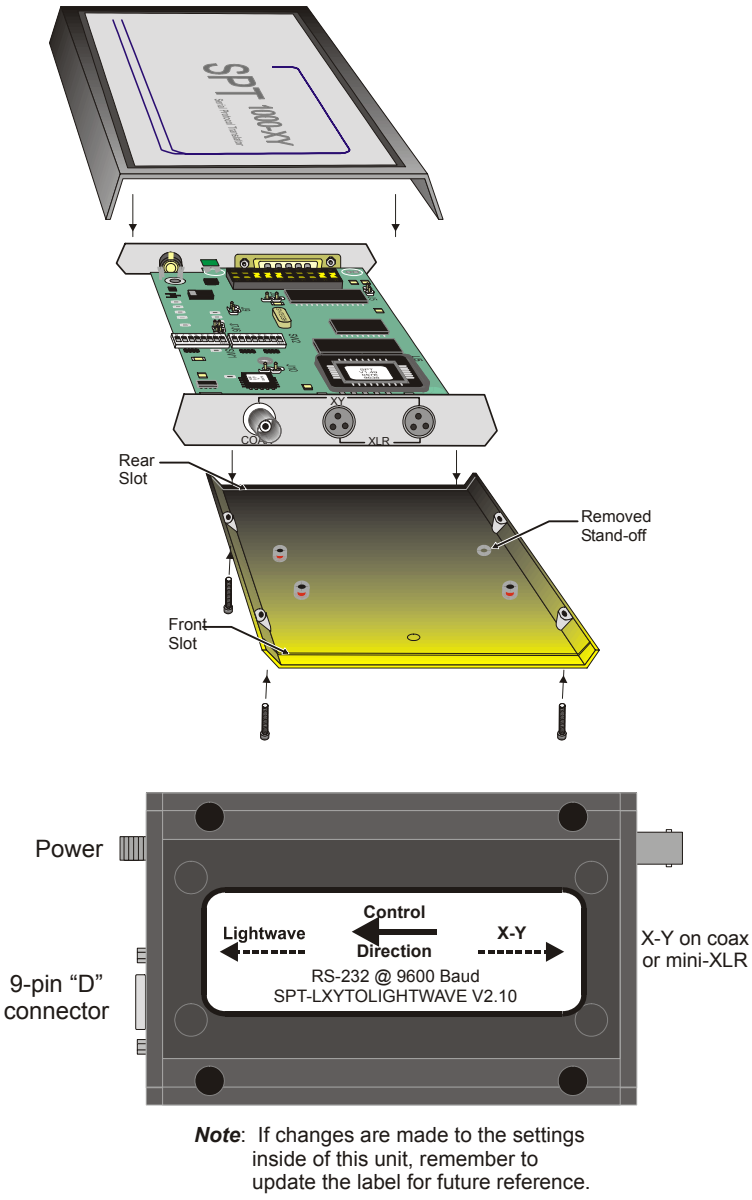

SW2
SW1
ON
1 2 3 4 5 6 7 8
SW2 Poles 1-6: Protocol select
LXYTOLIGHTWAVE
Must be set to this setting to operate in the LXYTOLIGHTWAVE mode
SW2 Poles 7-8: Baud rate select
4800
9600 *
19200
38400
SW1 Poles 1-2: Reserved for future use
Reserved for future use
Leave in OFF position
SW1 Pole 3: RS-422 termination
Unterminated
Leave OFF (unterminated) when configured as RS-232
Terminated *
SW1 Pole 4: RS-232/RS-422 preference
RS-232 on serial port *
RS-422 on serial port
The serial port level of the Matrix-Hub handles both RS-232 and RS-422 connections, but only one or the other at a time can be used for a source's level.
SW1 Pole 5: Level offset
SPT will use levels (4–7) *
SPT will use levels (0–3)
Levels are consecutive in the following order: Video, Mouse and Keyboard, Serial Port, Other. Levels can be enumerated as the top 4 levels (4–7) or bottom 4 levels (0–3).
SW1 Poles 6-8: Device ID settings
0
1 *
2
3
4
5
6
7

**Figure 3-2.** DIP Switch Settings

# Reassembling the Unit

To avoid damage to the SPT-LXYTOLIGHTWAVE circuitry, the unit must be reassembled as shown in Figure 3-3. Note that one of the four standoffs on the underside of the bottom cover has been removed. Orient the cover so that this area is positioned directly over U1. If U1 is positioned under an intact standoff, the standoff will press against the component, and possibly cause damage to the unit.




***Note***: If changes are made to the settings inside of this unit, remember to update the label for future reference.

**Figure 3-3.** Reassembling the Unit

# Protocol Notes

The SPT-LXYTOLIGHTWAVE protocol is an RS-232 protocol. When the SPT-LXYTOLIGHTWAVE is powered up, it requires approximately 4 seconds to update the internal status table.

## System and Matrix-Hub Discovery

### System Discovery

SPT-LXYTOLIGHTWAVE supports the discovery of a new Matrix-Hub router, and the loss of communication with the previously discovered Matrix-Hub. SPT-LXYTOLIGHTWAVE will also query and report alarms for the connected Matrix-Hub.

### Matrix-Hub Discovery

The SPT-LXYTOLIGHTWAVE will go into a discovery sequence on startup. During the discovery sequence the unit will establish the frame size, and crosspoint connects of the connected Matrix-Hub. Crosspoint information will then be relayed back to X-Y.

The SPT-LXYTOLIGHTWAVE will remain in discovery until the following events complete:

1. The Lightwave unit accepts and responds to the default password "**mh1**."
2. A Lightwave CL message is sent to the Matrix-Hub to query frame size.
3. A Lightwave CL response message is received to indicate the frame size are received.
4. The frame size is sent on X-Y.
5. A Lightwave CS message is sent for each level found during frame size discovery to query crosspoints at each level.
6. A Lightwave CS response is received for each level queried.
7. Data from each crosspoint disclosed in the CS response message is sent via an **S:** message to X-Y.

**Note**

The default password (mh1) is case-sensitive. The system will not respond to the default password if it is entered in all-caps or caps-lowercase.

## Loss of Communication

The SPT-LXYTOLIGHTWAVE will detect when the previously discovered Matrix-Hub has been disconnected. Upon detection the SPT will transmit a series of frame size messages indicating the change (typically, "frame size 0").

# Detecting and Reporting Alarm Conditions

**Note**

See "Protocol Commands" on page 15 for descriptions of the commands and messages described in this section

Unlike Harris products, the Lightwave Matrix-Hub will not send the bus unsolicited alarm messages when an alarm occurs. To simulate operation as a Harris router, the SPT-LXYTOLIGHTWAVE will periodically send the Lightwave CP <**Level**> command to query for alarms.

1. After receiving the solicited CP response the message is parsed. If an alarm condition exists:
   - The alarm value is stored in the event that X-Y solicits for alarms later with the **Q?** message.
   - An unsolicited **Q:** alarm with the new alarm information is sent back on X-Y.
2. Matrix-Hub CP response messages will be in the following formats:

   2PP1,Power Supply A +5V: OK

   2PP1,Power Supply A -5V: OK

   2PP0,Power Supply B +5V: Failed

   2PP0,Power Supply B -5V: Failed

   2PT 95ßF

   2PT 97ßF

   2PT 91ßF
3. The SPT will convert Matrix-Hub status messages to alarm messages as follows:
   - If Power Supply A fails, the value "4" will be bit-masked into the alarm message. Within Harris router control applications, this alarm value will correspond to the Harris alarm "Power Supply 1 Failure."
   - If Power Supply B fails, the value "8" will be bit-masked into the alarm message. Within Harris router control applications, this alarm value will correspond to the Harris alarm "Power Supply 2 Failure."
   - If a temperature value exceeds 100° (either Centigrade or Fahrenheit), the value "1" will be bit-masked into the alarm message. Within Harris router control applications, this alarm value will correspond to the alarm "Fan 1 Failure."

     ***IMPORTANT***: Lightwave Communications has indicated that temperatures above 100°F may be a concern, since at this temperature VGA output may start to become distorted. However, in trial runs at Harris, standard operating temperatures often exceed this value.

     The elevated temperature may have little to do with an actual "Fan" malfunction in the Matrix-Hub. Currently, Harris has no alarm value to indicate elevated temperature. The temperature has been arbitrarily mapped to the Fan alarm, as a closest match solution.

     The temperature alarm condition is not dependent on the style of measurement (i.e., Centigrade, Fahrenheit), only that the units meet or exceed 100. You can disable this alarm by running the Lightwave with

"Display Temperature in °C" mode. This mode is enabled by adjusting the DIP switches in the Matrix-Hub control card (see "Other Information" on page 16).

For more information on the contents of the CP response message see the *Matrix-Hub Series 1000 User Manual*.

# Communication to Controller During Power Up

Communications with the SPT-LXYTOLIGHTWAVE will not begin until the discovery sequence completes. The discovery sequence cannot complete if there is no Matrix-Hub detected.

# Protocol Commands

## Commands Handled Between X-Y and SPT-LXYTOLIGHTWAVE[1]

The SPT-LXYTOLIGHTWAVE protocol supports the following X-Y commands:

**Table 3-2.** X-Y Commands Supported by SPT-LXYTOLIGHTWAVE Protocol

| Command Syntax (command begins with "@" sign followed by a space) | Command Name | Result |
|---|---|---|
| **@ Q?** | Alarms Request | Requests status of all alarms in system |
| **@ B:C** | Clear Preset Buffer | Clears all presets |
| **@ I?A** | Device Description Request | Device information description |
| **@ I?T** | Device Type Request | Device type information |
| **@ I?V** | Device Version Request | Device version information |
| **@ X:<Lvls>/<Dest>,<Src>[:I<ID>]** | Direct Crosspoint Take | Takes specified crosspoint (specifies source, destination, and level) without buffer execute command |
| **@ B:E** | Execute Preset Buffer | Executes all presets |
| **@ F?<Lvl>** | Frame Size Request | Requests router size on a specific level |
| **@ P:<Lvl>/<Dest>,<Src>[:I<ID>]** | Preset Crosspoint | Presets or preloads crosspoint requests for execution at a later time |
| **@ S?<Lvls>** | Request Crosspoint Status– Entire Level | Requests crosspoint status of all destinations on a specified level |

[1] You must be in Pass-Through Protocol mode to execute these X-Y commands. See the *Serial Protocol Reference Guide* for more information about pass-through protocol commands.

**Table 3-2.** X-Y Commands Supported by SPT-LXYTOLIGHTWAVE Protocol *(Continued)*

| Command Syntax (command begins with "@" sign followed by a space) | Command Name | Result |
|---|---|---|
| **@ X?<Lvl><Dest>** | Request Crosspoint Status – Single Destination | Requests crosspoint status of a specific destination on a specific level |
| **@ P?<Lvl><Dest>** | Request Preset Crosspoint Status | Verifies source that has been preset to a given destination on a specific level |
| **@ V?<Lvl>** | Request Preset Crosspoint Status On Level | Verifies source that has been preset to any destination on a given level |
| **@ Z:<Lvls>** | Reset Levels | Simulates a reboot of the SPT |
| **@ B:R** | Reset Preset Buffer | Resets or clears all presets (replaced in most products with @ B:C Clear Preset) |

### Commands Issued Between SPT-LXYTOLIGHTWAVE and Matrix-Hub

The following commands are supported internally in transactions between the SPT-LXYTOLIGHTWAVE and the Matrix-Hub. The user does not call these commands directly over X-Y.

**Table 3-3.** Lightwave Matrix-Hub Commands

| Command Syntax | Result |
|---|---|
| CL | Lists all chassis cards in inventory |
| CP | List of power supply and temperature status |
| CS | List of active connections |
| C | Connects input port to output port |
| D | Disconnects input port from output port |

# Other Information

- The SPT will support a matrix of up to 128 sources by 128 destinations on 4 levels.
- Currently, the only point of entry for control of the Matrix-Hub Series 1000 switcher is the Matrix-Hub serial "in" port. The SPT-LXYTOLIGHTWAVE assumes sole control of the Matrix-Hub system. Future enhancements in control schemes that may be developed to use more than one controller will have adverse effects on the performance of the SPT-LXYTOLIGHTWAVE, and are not recommended.
- The SPT-LXYTOLIGHTWAVE assumes control of a maximum of four switching levels. When used in conjunction with a Harris router system the Harris system cannot use more than four levels.

- In the native mode of operation Matrix-Hub has default user privilege levels. When used with the SPT-LXYTOLIGHTWAVE the Matrix-Hub password user levels will be inherently determined by your ability to log onto the workstation running the RouterWorks® application.
- The Matrix-Hub allows a source to be taken to multiple destinations on the monitor level, but not on other levels. As a result, if a keyboard, mouse, or serial port is taken to multiple destinations, only the last destination specified in the command (or in the preset buffer) will be taken on these levels. Other conflicting destination levels will be left disconnected.
- Successful use of the Matrix-Hub with the SPT-LXYTOLIGHTWAVE requires that you configure the Matrix-Hub DIP switch settings as per the *Matrix-Hub Series 1000 User Manual*. Additionally, you must configure the optional user preference settings as shown in Table 3-4.

**Table 3-4.** Optional User Preference Settings

| Matrix-Hub DIP Switch Position | DIP Switch Settings | Feature Result |
|---|---|---|
| SW2, Poles 1-8 | 00000000 = 19200 baud<br>OR<br>00000010 = 9600 baud<br>OR<br>11000001 = 4800 baud | Baud rate must match SPT baud |
| SW3, Pole 1* | 0* | Display temperature in °F* |
| SW3, Pole 2 | 1 | Echo characters ON |
| SW3, Pole 3 | 1 | Send error messages |
| SW3, Pole 4 | 0 | Do not add line feed to outputs |

* To disable temperature alarm, set to "1."

# References

The following documentation used the following references for implementing the protocol translation:

*Matrix-Hub Series 1000 User Manual*, 13 July 2001, Lightwave Communications (© 1999-2000, Lightwave Communications, Inc., 100 Washington Street, Milford CT 06460)

*Serial Protocol Reference Operation and Reference Manual*, Edition C (© July 2002)

Appendix A

# Safety Precautions, Certifications, and Compliances

## Overview

Carefully observe the safety alert symbols below for dangers, warnings, and cautions. They alert installers and operators of possible dangers or important information contained in this manual.

*Keep in mind, though, that warnings alone do not eliminate hazards, nor are they a substitute for safe operating techniques and proper accident prevention measures.*

Any user-serviceable components (such as fuses or batteries) are only replaceable by those components listed in the manual.

***IMPORTANT!*** Only qualified personnel should perform service procedures.

# Safety Terms and Symbols in this Manual

**WARNING**

**Statements identifying conditions or practices that may result in personal injury or loss of life. High voltage is present.**

**CAUTION**

**Statements identifying conditions or practices that can result in damage to the equipment or other property.**

# Safety Terms and Symbols on the Product

***DANGER:*** *High voltage and indicates a personal injury hazard immediately accessible as one reads the marking.*

***WARNING:*** *Indicates a personal injury hazard not immediately accessible as one reads the marking.*

***CAUTION:*** *Indicates a hazard to property, including the product, or to pay attention and refer to the manual.*

*Protective ground (earth) terminal.*

***Fuse.*** *Replace with same type and rating of fuse.*
*Zur Vermeidung von Feuer verwenden Sie nur Sicherungen mit der für dieses Produkt geforderten Typ und Stromstärke.*

# Preventing Electrostatic Discharge

**Observe precautions for handling electrostatic sensitive devices.**

***CAUTION:*** Electrostatic discharge (ESD) can damage components in the product. To prevent ESD, observe these precautions when directed to do so:

1. ***Use a Ground Strap.*** Wear a grounded antistatic wrist strap to discharge the static voltage from your body while installing or removing sensitive components.
2. ***Use a Safe Work Area.*** Do not use any devices capable of generating or holding a static charge in the work area where you install or remove sensitive components. Avoid handling sensitive components in areas that have a floor or benchtop surface capable of generating a static charge.
3. ***Handle Components Carefully.*** Do not slide sensitive components over any surface. Do not touch exposed connector pins. Handle sensitive components as little as possible.
4. ***Transport and Store Carefully.*** Transport and store sensitive components in a static-protected bag or container.

# Injury Precautions

**WARNING**
Potentially lethal voltages are present within the frame during normal operation. The AC power cord must be disconnected from the frame before the top panel is removed. (In frames with multiple power supplies, remove ALL power cords.) Power should not be applied to the frame while the top is open unless properly trained personnel are servicing the unit.
*Pull out the plug from the main socket before the removal of a cover.*
Przod zdjeciem pokrywy wyciagnac wtyczke z gniazda sieciowego.

**WARNING:** *SHOCK HAZARD - DO NOT OPEN.*
AVIS: *RISQUE DE CHOC ÉLECTRIQUE - NE PAS OUVRIR.*
*MOUNT IN RACK ONLY*
I*NSTALLER SUR SUPPORT DE MONTAGE SEULEMENT.*

**Use proper power cord**

To avoid fire hazard, use only the power cord specified for this product.

**Ground the product**

This is a Safety Class 1 product and is grounded through the grounding conductor of the power cord. To avoid electrical shock, the grounding conductor must be connected to earth ground. Before making connections to the product's input or output terminals, ensure the product is properly grounded.
***WARNING:*** *THIS APPLIANCE MUST BE GROUNDED.*
***WARNING:*** *THIS APPLIANCE MUST BE EARTHED.*
***VARNING:*** *APPARATEN SKALL ANSLUTAS TILL JORDAT UTTAG NÄR DEN ANSLUTS TILL ETT NÄTVERK.*

**Do Not Operate Without Covers**

To avoid electrical shock or fire hazard, do not operate this product with covers or panels removed.

**Use Proper Fuse**

To avoid fire hazard, use only the fuse type and rating specified for this product.

**Do Not Operate in Wet/Damp Conditions**

To avoid injury or fire hazard, do not operate this product in wet or damp conditions.

**Do Not Operate in an Explosive Atmosphere**

To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

**Avoid Exposed Circuitry**

To avoid injury, remove jewelry such as rings, watches, and other metallic objects. Do not touch exposed connections and components when power is present.

# Product Damage Precautions

**CAUTION:**

Disconnect power from the frame before removing or installing input/output modules. Removing or installing modules with power applied could cause serious damage to system components.

**Use Proper Power Source**

Do not operate this product from a power source that supplies more than the specified voltage.

**Use Proper Voltage Settings**

Before applying power, ensure that the line selector is in the proper position for the power source being used.

**Provide Proper Ventilation**

To prevent product overheating, provide proper ventilation.

**Do Not Operate With Suspected Failures**

If you suspect there is damage to this product, have it inspected by qualified service personnel.
***CAUTION:*** This unit can have more than one power supply cord. To de-energize the internal circuitry, you have to disconnect all power cords.
***ADVARSEL:*** Utstyret kan ha mere ennn en tilførselsledning. For å gjore interne deler spennigsløse må alle tilførselsledningene trekkes ut.
***VARNING:*** Denna apparat har mer än en nätanslutning. Samtliga nätkablar måste bortkopplas för att göra de interna kretsarna spänningsfria.

***FUSE:*** REPLACE WITH SAME TYPE AND RATING OF FUSE.
***CAUTION:*** REPLACE WITH SAME TYPE FUSE.
***ATTENTION:*** UTILISER UN FUSIBLE DE RECHANGE DE MÊME TYPE.
***CAUTION:*** DISCONNECT SUPPLY CORD BEFORE CHANGING FUSE.
***ATTENTION:*** DÉBRANCHER AVANT DE REMPLACER LE FUSIBLE.
***ACHTUNG:*** VOR AUSWECHSELN DER SICHERUNG IST DAS GERÄT VOM NETZ ZU TRENNEN.

**CAUTION**

Disconnect power from the frame before removing or installing input/ output modules. Removing or installing modules with power applied could cause serious damage to system components.

**Use Proper Power Source**

Do not operate this product from a power source that supplies more than the specified voltage.

# EMC and Safety Standards

This product has been tested and found to comply with the following IEC, FCC, UL, ICES, and CSA standards, per the provision of the Electromagnetic Compatibility Directive 89/336/EEC of 3 May 1989 as amended by 92/31EEC of 28 April 1992 and 93/68/EEC, Article 5 of 22 July 1993, and the Low Voltage Directive 73/23/EEC of 19 February 1973.

## EMC Standards

**Table A-1.** EMC Standards

| EMC Standard | Description |
|---|---|
| EN55014 | Limits and Methods of Measurement of Radio Disturbance Characteristics of Electric Motor-Operated and Thermal Appliances for Household and Similar Purposes, Electric Tools, and Similar Electric Apparatus |
| EN55022 | Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment-Class A |
| EN55103-1 | Electromagnetic Compatibility — Product Family Standard for Audio, Video, Audio-Visual, and Entertainment Lighting Control Apparatus for Professional Use — Part 1: Emission, Environment E4 |
| EN55103-2 | Electromagnetic Compatibility — Product Family Standard for Audio, Video, Audio-Visual, and Entertainment Lighting Control Apparatus for Professional Use — Part 2: Immunity, Environment E4 |
| EN61000-3-2 | Limits for Harmonic Current Emissions (Equipment Input Current Less Than or Equal to 16 A Per Phase) |
| EN61000-3-3 | Limitations of Voltage Fluctuations and Flicker in Low Voltage Supply Systems for Equipment with Rated Current Less Than 16 A |
| EN61000-4-2 | Electrostatic Discharge Requirements “ESD” 2 kV CD, 4 kV AD |
| EN61000-4-3 | Radiated Radio-Frequency Electromagnetic Field Immunity Test 1 V/m {1 kHz 80% AM, 80-1000 MHz} |
| EN61000-4-4 | Electrical Fast Transient Requirements “Burst,” 0.5 kV Sig. & Ctrl. Lines 0.5 kV a.c. & d.c. Power Line, 0.5 kV Functional Earth |
| EN61000-4-5 | Surge Immunity Test 0.5 kV a.c. Power Line |
| EN61000-4-6 | Immunity to Conducted Disturbances Induced by Radio Frequency Fields 1 V rms 0.15-80 MHz Sig. & Ctrl. Lines, 3 V rms 0.15-80 MHz d.c. Power Line, 1 V rms 0.15-80 MHz a.c. Power Line, 1 V rms 0.15-80 MHz Functional Earth |
| EN61000-4-11 | Voltage Dips, Short Interruptions, and Voltage Variations- Immunity Tests |

These devices are for professional use only and comply with Part 15 of FCC rules. Operation is subject to the following two conditions:

1. These devices may cause interference to radio and TV receivers in residential areas.
2. These devices will accept any interference received, including interference that may cause undesired operations.

Changes or modifications not expressly approved by Harris Corporation, the party responsible for compliance to the FCC Part 15 Rule, could void the user's authority to operate this equipment legally in the United States.

These devices do not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference standard entitled "Digital apparatus," ICES-003 of the Canadian Department of Communications.

## Additional EMC Information

This device is for professional use in a controlled EMC environment, such as purpose-built broadcast studios.

EMC regulations require that the radiation emitted from this unit does not exceed certain limits. These limits are only met when the front panel is closed and the two thumb screws are secured.

Compliance to the EMC regulations is also dependent on the use of suitably shielded (screened) cables. Coax cables should be of the double-shielded (screened) variety. Unused BNCs should be fitted with 75Ω terminations.

All audio cables should be screened with the shield (screen) making good contact with the metallic parts of the cable connectors.

D-type connectors used with this unit should always have metallic shells with the shield (screen) of the cable mechanically bonded to the metal shell. It is further recommended that the D-type cable connectors be of the "dimple" variety. These connectors make a better contact and consequently improve EMC performance.

# Safety Standards

**Table A-2.** Harmonized and Reference IEC Safety Standards

| Harmonized Standard | Reference IEC Standard | Description |
|---|---|---|
| EN 60950:1992 with Am1, Am 2, Am 3, Am4, A11 amendments | IEC 60950:1991 (Modified) | Safety of Information Technology Equipment |
| EN 60950 | IEC 60950:1999 (Modified) | Safety of Information Technology Equipment |
| | IEC 60950-1 (2001-10) | Information Technology Equipment Safety—Part 1: General Requirements |
| EN 60065 | IEC 60065: 1998 (Modified) 6th Edition | Audio, Video, and Similar Electronic Apparatus Safety Requirements |
| | IEC 60065 (2001) 7th Edition | Audio, Video, and Similar Electronic Apparatus Safety Requirements |
| | Amendment 1 to IEC 60065 7th Edition | Audio, Video, and Similar Electronic Apparatus Safety Requirements |
| EN 60825-1:1999 | IEC 60825-1:1993 | Safety of Laser Products—Part 1: Equipment Classification, Requirements, and User's Guide |
| EN 60825-2:2000 | IEC 60825-2:2000 | Safety of Laser Products—Part 2: Safety of Optical Fibre Communication Systems |
| | IEC 60825-1 (2001-08) Edition 1.2 | Safety of Laser Products—Part 1: Equipment Classification, Requirements, and User's Guide |
| UL 1419 (March 28, 1997 | 2nd Edition | Standard for Professional Video and Audio Equipment |
| UL 6500 (September 30, 1999) | 2nd Edition | Standard for Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use |
| UL 60950 (December 1, 2000) | 3rd Edition | Safety of Information Technology Equipment |
| CAN/CSA-C22.2 No. 60950-00 | | Safety of Information Technology Equipment (Bi-National Standard, with UL 60950) |
| CAN/CSA-E60065-00 | | Audio, Video and Similar Electronic Apparatus Safety Requirements (Adopted IEC 60065:1998, 6th Edition, with Canadian Deviations) |
| CAN/CSA-C22.2 No. 1-98 | | Audio, Video, and Similar Electronic Equipment |
| CSA C22.2 No. 1-98 including Am1 (June, 2003) | | Audio, Video, and Similar Electronic Equipment |

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